

EARTHQUAKE HAZARD ASSESSMENTS FOR BUILDING CODES

Proposal Number: M18-057

SEMI ANNUAL REPORT FOR THE PERIOD April 2000-October 2000

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SECTION I: TECHNICAL PROGRESS

A) Research objectives

The overall aim and specific objective of the project is to produce maps and charts that will provide the necessary seismological data for the implementation of building codes and regulations in Jordan, Israel and the Palestinian National Authority.

During the first year, we have concentrated our efforts in initiating and performing a wide spectrum of activities that will lead to:

1. A unified catalogue of earthquakes.
2. Update regionalization of seismogenic zones and assessment of their seismic capabilities.
3. Scaling laws of dynamic source parameters of local and regional earthquakes and attenuation of seismic energy across the region.

B) Research accomplishments

During the first year of the project we have accomplished the following research goals:

- Compilation of the geological and Geophysical information in Israel and in Jordan by the Geological Survey of Israel, The geophysical Institute of Israel and the Geology Directorate of the Natural Resources Authority in Jordan.
- Compilation of a UNIFIED earthquake catalog for the period 1900 – 1999. The catalog is currently unified with respect to the list and location of the events. This task will be completed when we unify the magnitude determinations. (See attached map of epicenters).
- The unified magnitude scale will be based on the seismic moment determinations. We have developed preliminary correlation functions between the local magnitudes and the moment magnitude termed M_m (to differ from M_w due to the fact that most of the determinations are based on short period measurements). The suggested relationships are:

$$M = 1.01 + 0.66 M(NRA)$$

$$M = 1.11 + 0.61 M(GII)$$

$$M(GII) = 0.97 \log M_o - 16.9$$

Where M is the unified magnitude (Moment magnitude) and M_o is the Seismic Moment

- Intra-national discussions with the engineering communities in the Palestinian territories (ESSE), Jordan (NRA & Association of the Eng.) and Israel (GII & the Inst. of Standards of Israel). First stage analysis of strong ground motions has been completed, suggesting that the attenuation function of Boore et al. (1994) is applicable to our region. These findings are to be verified by additional strong motion data.
- Software for data acquisition (GII-SDA) has been implemented on the systems used in the project.

- New software for data processing of the data acquired by the project (seismograms and accelerograms) has been developed. The program named SEISPECT is currently documented and is in the debugging stage.
- The acquired ARCVIEW GIS software is still exercised.

C) Scientific impact of cooperation.

After the first project's workshop in March 2000, we held two meetings/workshops. The first was in Nablus and focused on training the technical staff to install, maintain and operate the ETNA strong motion accelerograph. The second took place in Istanbul, Turkey at the occasion of the RELEMR workshop in October 2000. The focus of that workshop was on earthquake hazard and risk assessments and included a two days training course on that subject by Dr. T. Algermissen (retired from the USGS and author of seismic building codes for the US).

D) Description of project impact

The collaborating institutions have briefed their authorities about the project and its practical impacts.

E) Strengthening of ME institutions

1. Five strong motion accelerographs (ETNA manufactured by Kinnemetrics, California) were delivered to ESSE. The technical staff was trained during July 2000. The ETNA systems were installed in the Palestinian territories and are maintained by using a laptop computer that eventually will be part of the seismic data acquisition system. A PC (Compaq) was also purchased to support data processing.
2. Five strong motion accelerographs (ETNA manufactured by Kinnemetrics, California) were delivered to NRA. These have been installed at various locations in Jordan.
3. Following the NRA's requirements for upgrading its national seismic network, GII has provided a PC based data acquisition system (GII-SDA) that acquires data from the national seismic network. GII has added new software for reformatting of the data to facilitate routine data processing by different s/w including the SEISAN.
4. ESSE, NRA and GII analysts have participated in a training course where the SEISAN software was taught. The training (April 2000, Istanbul, Turkey) was organized as part of the RELMR initiative.

F) Future work

The turmoil events in the Middle East have disrupted our operations. We were planning to meet in October 2000 to complete some of our intermediate tasks like issuing a map of epicenters, determination of seismogenic zones, training on empirical determinations of site effects and dynamic characteristics of buildings (using the new systems of the project). All these activities are postponed by a couple of months and we hope to resume cooperation immediately after the Ramadan.

SECTION II : Project management and Cooperation

A) Managerial Issues

1. Thanks to the active participation of Dr. Walter Hays and as declared in our proposal, the project is fairly well integrated into the RELEMR activities. In that respect, NRA will serve as a focus for earthquake catalogues of the Middle East, GII will provide unified magnitude formulae for the whole of the Mediterranean region and much of the training in Engineering Seismology will be integrated with the RELEMR activities.
2. The NRA has opened a special bank account that enables the transfer of money from GII to NRA.
3. During March-October 2000 we conducted and participated in the following workshops:
 - (1) March 2000, Amman, Jordan: 4 days workshop organized by NRA.
 - (2) April 2000, Istanbul, Turkey: A training course for using the SEISAN s/w. Organized by RELEMR.
 - (3) July 2000, Nablus, Palestinian National Authority: Workshop & training course (3 days) on the ETNA strong motion accelerometer. Organized by ESSE.
 - (4) October 2000, Istanbul, Turkey: A regional workshop on Seismic hazard and risk assessments. Organized by RELEMR.

Note: RELEMR activities are integrated in the project but are NOT financed in any way by the project.

B) Special Concerns

We are very much concerned about the new political situation in the region. It is tentatively agreed that we shall try to resume the activities of the project until after the Ramadan. Meanwhile, each institution will do its best to perform on its own. GII and NRA have no difficulties to cooperate.

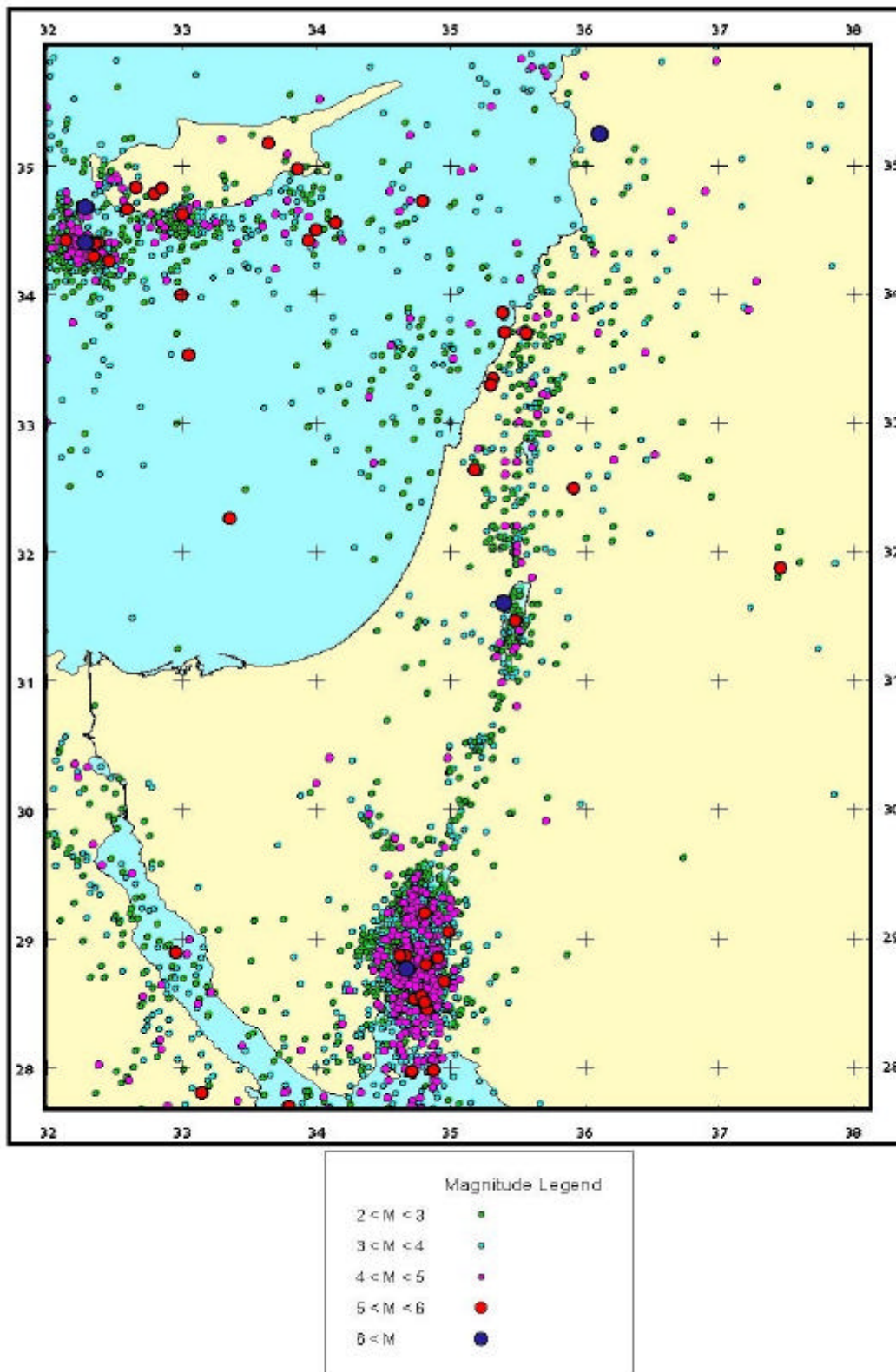
C) Cooperation, Travel, Training & publications:

1. A technical training course was organized by ESSE and took place in Nablus during

D) Request for USAID actions

No requests

Map of Epicenters 1900-1999
Based on the Unified earthquake catalog of GII and NRA



Appendix A: Purchased Equipment

System	NRA	ESSE	GII
Accelerometers	5	5	-
GII-SDA	1	-	-
PC-Process	-	(1)	-
Portable SDA	(1)	(1)	-
ArcView	(1)	(1)	1

Remarks:

1. The Accelerometers are ETNA of Kinnemetrics, CA.
2. GII-SDA is a PC based data acquisition system for the Jordan Seismic Network that includes a desktop PC, A/D converter, GPS receiver and DC filters.
3. PC-Process is a desktop PC for data processing. The figure in brackets means that it has been purchased but not yet delivered to ESSE.
4. The Portable SDA is a PC based data acquisition system for site and building response measurements. It includes laptop PC, A/D card, GPS receiver, LAN card, 12 channel amplifier-filter box (GII design), 9 seismometers L4C and cables.
5. ESSE has received the laptop of its portable SDA. The other parts of these systems are at GII waiting to be delivered.
6. The GIS s/w ArcView was purchased with three licenses.